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Ultrasonic Ranging controller module

User Manual

version: V1.4

model: WT81B003-0202

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Thank you for purchasing the only record of Salon ultrasonic ranging module controller

Product replacement fast, this manual is for models to WT81B003-0202 The ultrasonic ranging controller module

If the version update, without notice, so stay tuned to our website

目录

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产品简介

- **principle**

The ultrasonic probe ultrasonic pulse is transmitted from the start time, it is propagated through the air to the medium Object to be measured, after reflection back to the ultrasound probe, instantly stop the clock. The ultrasonic again in

Known propagation velocity of the air: C = C0 + 0.607 × T Deg.] C (wherein C0 Is zero, sonic

The air velocity is about 331.5m / s ; T The current actual temperature) can be calculated

The reflecting surface of the probe to a distance: S = (331.5 + 0.607 × T Deg.] C) * t / 2 .

- **Feature**

1. High degree of protection;

2. Easy to use, convenient operation;

3. High accuracy, high resolution;

4. Standard DC12V power supply, easy to use;

5. With precision temperature and output temperature compensation function;

6. Detection distance farthest detection distance 18 m or less;

7. A housing having a physical flare, has good directivity and stability;

8. Diversified output, a serial port output, PWM output, the switching output.

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- **Electrical parameters**

	PWM Export	Serial output	Switch output
Supply voltage	12V , Ripple is less than 100mV		
Quiescent Current	approximately 20mA		approximately 25mA
Working current	approximately 22mA		approximately 25mA
Center frequency	40KHz		
Blocking distance	500mm		
Starting point detection	In the default surface of the probe, the need to flare planar minus about 40mm		
The most remote	Less than or equal 18 Meter		
Emission angle	<20 °		
Working period	125mS		250mS
Trigger	Falling edge		Then the power to
Accuracy Ranging	± 10cm (Distance measurement and a distance dependent)		
Resolution	1mm		
Temperature compensation	No compensation	make up	
Temperature output	no	Have	no
Operating temperature	--25 ℃ - 70 ℃		
storage temperature	- 40 ℃ -85 ℃		

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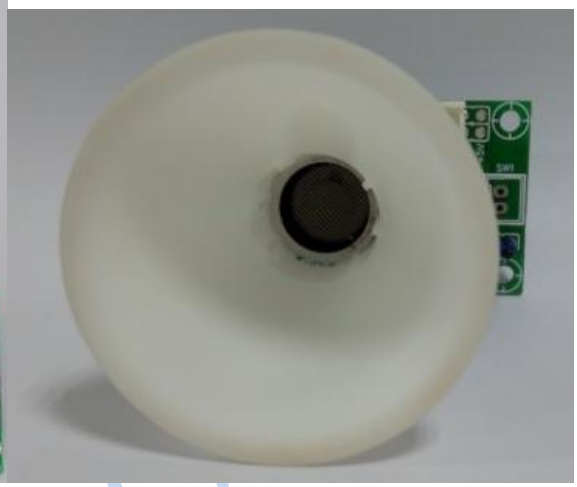
使用说明

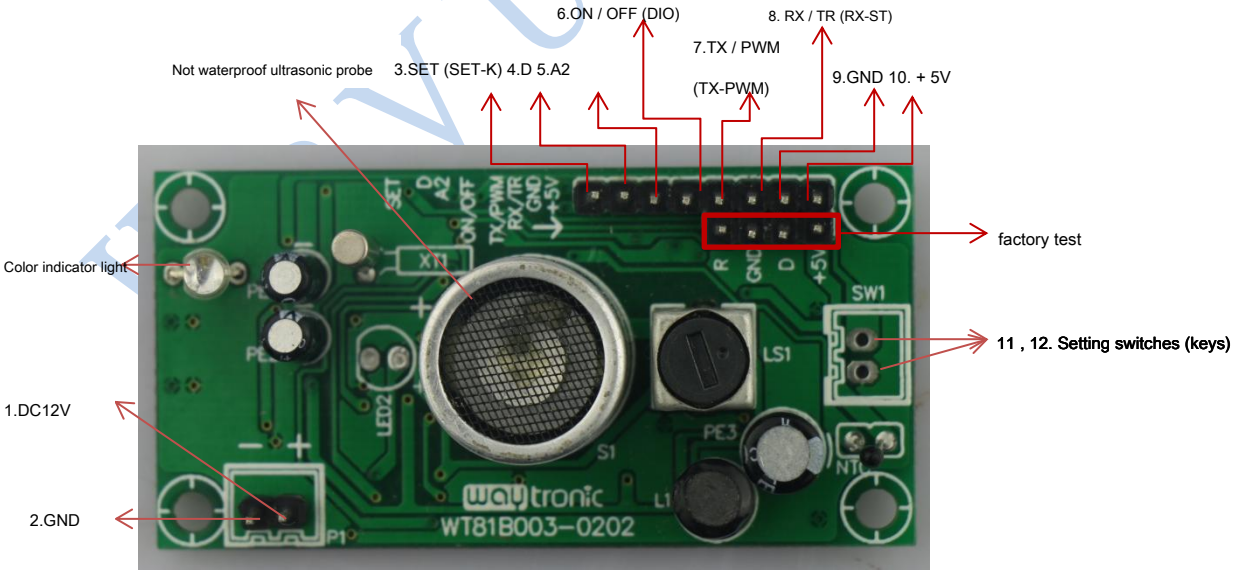
- **Physical map**

Physical map 1



Physical map 2

- **Interface Description**



Physical map 3

among them

1. As DC12V power supply positive terminal (+ 12V), the 11V-13V range of external

Between the DC voltage;

2. As the negative electrode GND supply pin (GND), then the power ground;

3. SET (SET-K) is provided as the switch (button) external lead pins;

4. D as a spare I / O;

5. A2 as a spare I / O;

6. ON / OFF (/ DIO) as an output pin (ON / OFF), the board has 1K resistor in series,

In the output mode switch level switch, a high level is 5V, the low level is 0V;

7. TX / PWM (/ TX-PWM) as an output pin (TX / PWM), the board has 1K resistor in series,

TTL level serial output signal in the serial mode, TTL output in PWM mode

Level of the PWM signal;

8. RX / TR (/ RX-ST) as a trigger pin (RX / TR), the board has 1K resistor in series,

Maximum input low trigger voltage 0.8V, the minimum high level input 2.0V, not

More than 5.5V;

9. As the negative electrode GND supply pin (GND), then the power ground;

10. + 5V power supply with an external application, the power supply current is less than 50Ma;

11. Set switch (button) pin;

12. Set switch (button) pin.

To facilitate the user to set the output mode, the calibration threshold value, and on the opposite side of the module 11

Pin relative position, there is a key touch, that is, setting switch (button).

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- **Operating instructions**

Ultrasonic controller has three output modes: serial output (light red), PWM Output (light green), the switching output (red and green LEDs). Property

When the product is a factory default serial output mode, the output can be switched by setting a switch (button)

A mode change indicator will indicate the status of the corresponding switch. When the power to the controller module

After the indicator light corresponding to the operation mode 1 second off.

- **Trigger Description**

1, When the trigger pin "8.RX / TR (/ RX-ST)" has been high, the controller is

Low power standby state.

2, When the trigger pin "8.RX / TR (/ RX-ST)" is falling, the falling edge of low power requirement

0.1-10Ms level hold time. If the controller is in serial mode, it is triggered Workers

For once, thereby outputting a serial data; if the controller in the PWM mode,

Will be triggered once the work so as to output a PWM signal.

3, When the trigger pin "8.RX / TR (/ RX-ST)" has been low, or directly connected

To supply, at this time the controller in the operating mode switch.

- **Indicator Description**

1, When the controller is operating in the serial output mode, after power, red indicator light, 1

After seconds off. The controller is once, the red indicator shows the falling edge work

Flashes once.

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2, When the controller is in the PWM output mode, after power, light is green, a

After seconds off. The controller is once, falling edge trigger indicator shows green work

Flashes once.

3, When the controller is operating in output mode switching, after power, while bright red indicator

And the color green, 1 second off. At the same time the indicator light off red and green like

State to indicate switch status in real time, for example, from the current value detected in the door threshold range

Inner circle, while the indicator light is red and green, are not within the sensing range, indicating

Light goes out.

- **Setting switch (button) instructions**

1, Shorting setting switch (button) (11, 12 coming. Setting switch (button) short)

After (less than 2 seconds) is disconnected, or short press button (less than 2 seconds), "serial output"

And two output modes "PWM output" may be alternately switched, the indicator will indicate the current

After switching state, after a successful handover controller memory module in this mode, power-down is not

It will be lost.

2, Shorting setting switch (button) (11, 12 coming. Setting switch (button) short)

(Greater than 3 seconds) is disconnected, or long press the key (more than 3 seconds), the controller will when

Before the distance measurement values saved as a threshold distance in the switch mode,

After the success controller module will remember this threshold distance, power-down is not lost.

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- **Output Format Description**

  - **Serial output**

The default is the product serial output mode at the factory. Whenever the trigger pin

" 8.RX / TR (/ RX-ST) "Is held low and the falling edge 0.1-10Ms Time, will

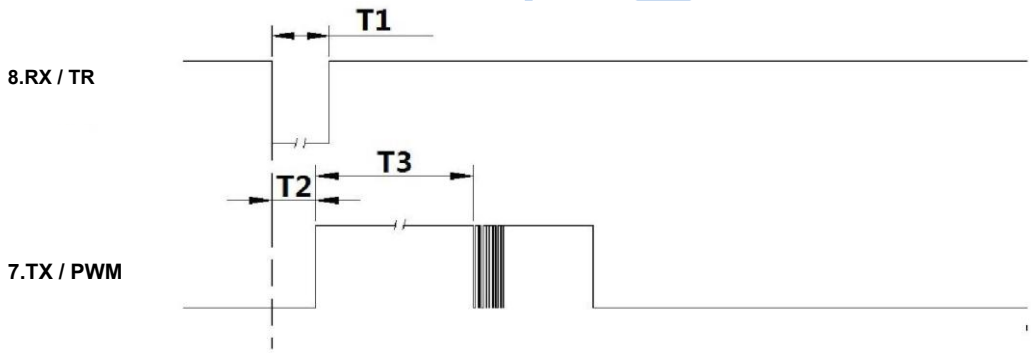
Trigger controller work once, the indicator flashes red once.

" 7.TX / PWM (/ TX-PWM) "Output a 5V TTL Level serial data, this data

Temperature compensated, " 7.TX / PWM (/ TX-PWM) "In the board has a series 1K Resistance, can be

And external 3V Users directly connected to the power supply board. The controller trigger period must be greater than 125Ms .

- **Timing Diagram:**



Note: T1 not less than 1Ms ; T2 = 9 ~ 11Ms ; T3 = 3 ~ 120Ms

- **Serial communication command frame format:**

	Interface Type	Start bit	Data stop bit	Parity	Baud Rate	
UART	Full-duplex	1	8	1	no	9600

- **Output frame format:**

	Explanation	byte
Header logo	Fixed 0Xff	1 byte (hex)
Data H	High data distance	1 byte (hex)
Data L	Lower data distance	1 byte (hex)
Temp H	High temperature data	1 byte (hex)
Temp L	Low temperature data	1 byte (hex)
SUM	Communications checksum	1 byte (low byte hexadecimal and cumulative)

- **Output Example:**

Example a: distance And a positive temperature

Header	Data H	Data L	Temp H	Temp L	SUM
0Xff	0x22	0Xb8	0x01	0x20	0Xfa

1, distance value calculation:

Distance value = (Data H) * 256 + (Data L) * 1 = 0x22B8;

Converted to decimal 8888;

At this time, the controller detects the distance is 8888mm, in millimeters

2, the temperature value is calculated:

Note: High temperature data (Temp H) is the most significant bit is 0, it indicates a positive temperature, in the case 1, the table

It shows a negative temperature. Since (Temp H) = 0b00000001, which up to 0, then the detected ambient temperature

Degree of positive temperature.

Temperature = (Temp H) * 256 + (Temp L) * 1 = 0x0120

288 is converted to decimal;

At this time, the controller detects a temperature value of 28.8 ℃, are in degrees centigrade

3, the low byte of the checksum calculation:

Note: The checksum value of the accumulation and retention of only the lower 8 bits

SUM = (header) + (Data H) + (Data L) + (Temp H) + (Temp L)

= 0Xff + 0x22 + 0Xb8 + 0x01 + 0x20 = 0x01FA frame data

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Whichever is the lower byte, compared 0Xfa

Example Two: Distance And negative temperature

Header	Data H	Data L	Temp H	Temp L	SUM
0Xff	0x1A	0x0A	0x81	0x0A	0Xae

one, **Distance value calculation:**

Distance value = (Data H) * 256 + (Data L) * 1 = 0x1A0A;

Converted to decimal 6666;

At this time, the controller detects the distance is 6666mm, in millimeters

2, the temperature value is calculated:

Note: High temperature data (Temp H) is the most significant bit is 0, it indicates a positive temperature, in the case 1, the table

It shows a negative temperature. Since (Temp H) = 0x81 = 0b10000001, which up to 1, it indicates that the detected ring

Ambient temperature of minus temperature.

Temperature = ((Temp H) & 0x7F) * 256 + (Temp L) * 1 = 0x010A

266 is converted to decimal;

At this time, the controller detects a temperature is -26.6 ℃, are in degrees centigrade

3, **Low byte checksum calculation:**

Note: The checksum value of the accumulation and retention of only the lower 8 bits

SUM = (header) + (Data H) + (Data L) + (Temp H) + (Temp L)

= 0Xff + 0x1A + 0x0A + 0x81 + 0x0A

= 0x01AE

Whichever is the lower byte, compared 0Xae

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- **PWM output**

In the PWM output mode, whenever the trigger pin "8.RX / TR (/ RX-ST)" falling edge

And maintaining low 0.1-10Ms time, it will work once the trigger controller, and then output

Pin "7.TX / PWM (/ TX-PWM) "The output of a 5V TTL-level PWM signal,

" 7.TX / PWM (/ TX-PWM) "In the board has a series 1K Resistance, with external 3V powered by

Plate is directly connected users. The controller trigger period must be greater than 125Ms.

- **Output Principle:**

When the trigger pin receives a falling edge of the trigger level, the internal controller automatically issues the module

40KHz ultrasonic wave, while the output pin "7.TX / PWM (/ TX-PWM) "It will be pulled up,

When detecting the echo signal back to the output pin is pulled low immediately, when the object is not detected

When, the output pin will be pulled down to about 120Ms detection end, the process temperature has not been

Compensation, temperature compensation at the discretion of the user. MCU PWM determination time can be a high level,

The round-trip time is a time ultrasonic detection object, the velocity can be calculated according to the distance

value.

- **Timing Diagram:**

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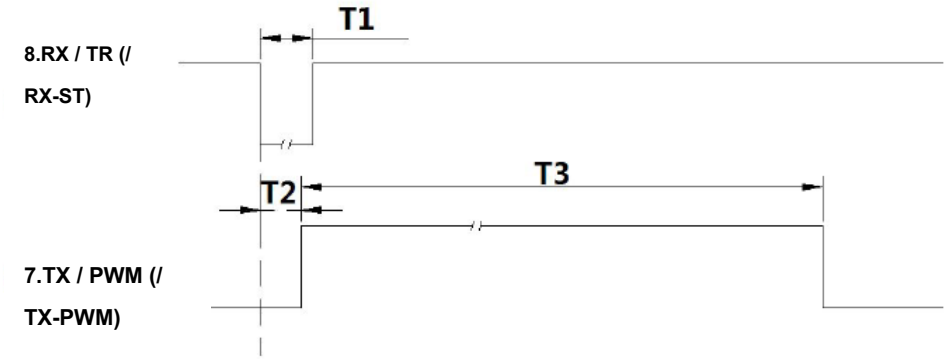

Note: T1 more than the 1Ms ; T2 = 9 ~ 11Ms ; T3 = 3 ~ 120Ms

- **Calculation:**

The formula is "High Time * distance = speed of sound / 2", the ultrasound at different temperatures

Propagation speed is: v = 331.5 + 0.6t (m / s). If the object is not detected, the output

The fixing pin output pulse of approximately 120Ms.

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- **Switch output**

To operate in the controller mode switch, as long as the trigger pin "8.RX / TR (/ RX-ST)"

Has been low, or directly to the power supply, the controller will work in this case switch mode,

With duty cycle 250Ms automatic detection range. Detection and distance values will be set before the door

Value is compared to control the output state of the switch.

- **Threshold settings:**

First step: assess the need to set the threshold distance value, the sensed object plane or stopper

Plate on the position sensing threshold distance value. For example, I want to set the threshold distance is 3 meters on

Placed in a plane 3 m baffles flat, Kongkuo environment to ensure accuracy.

Step two: Ultrasonic Ranging control module or object plane alignment of the ultrasound probe block

Plate, is provided with a switch (button), can be measured from the current value remains up as

Threshold distance. Controller is shipped with default threshold is 2 meters.

- **Output Control:**

Second, if the detected current value gate distance less than a set value, the output pin

"6.ON / OFF (/ DIO)" output low, while the red and green indicator lights,

1K series resistor board has. This poor low load capacity, the input current does not exceed

20mA, should the reference conditions as the control panel user rather than directly driving a load, but

You can control the optocoupler. To improve stability, the factory default low output time will be extended

Long 500Ms.

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three, If the distance threshold value of the current detected is greater than the set output pin

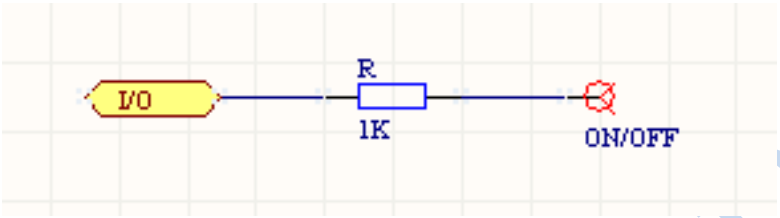
"6.ON / OFF (/ DIO)" high output 5V, while the light is off, the board has

1K series resistor. This high capacity tape is poor, the output current does not exceed 5Ma,

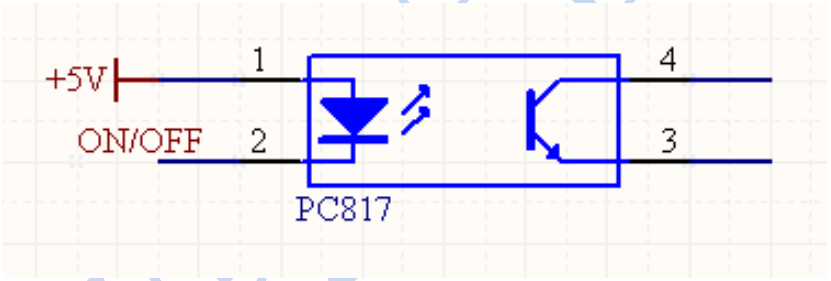
As the user should control board reference conditions rather than directly driving a load, but can be controlled

Optocoupler.

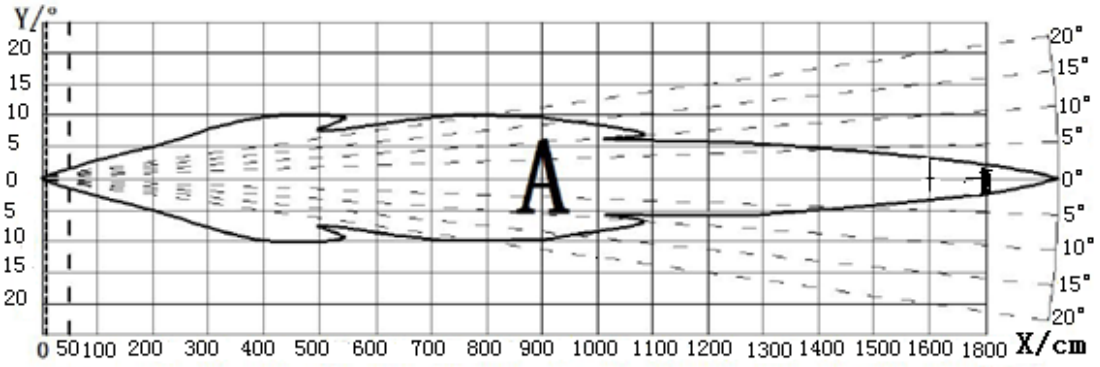
- **Switch output circuit:**



- **Control optocoupler circuits:**



- **Referring to FIG beam angle**



Note: --- 50cm distance for the blind

Measurable distance range of 50cm-1800cm

A: 50cm * 50cm range sensing axis perpendicular to the object plane distance

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- **Starting point detection range Description**

The actual value of the output from the detection surface of the ultrasonic probe is as a starting point, according to the physical m

The detection surface of the ultrasonic probe to the toroidal plane distance of about 40mm, in order to level the bell mouth

Surface as a starting point, the value to be subtracted from an output of about 40mm.

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应用场景

1, Back-up alert

2, Level Measurement

3, Intelligent car obstacle avoidance

4, Detection of vehicles entering and leaving the garage

5, Staff out of the room to detect

6, Monitoring and alarm response from

7, Robot distance sensing, obstacle avoidance

8, Teaching and research, security, industrial control

9, AI aircraft altitude measurement

10, In a certain area of the moving object monitoring

11, Intelligent traffic control, parking monitor

12, Object distance measurement, body height measurement

13, Approaching object, object movement trend determination, to detect the presence of

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Manual Version History

version	date	description
V1.0	2016-9-8	initial version
V1.1	2016-10-18	Modify some electrical parameters
V1.2	2016-12-8	Modify some explanation
V1.3	2017-3-13	Modify some parameters
V1.4	2017-3-16	Modify some pins screen representation

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